BACnet MS/TP I/O-Modules

Rev 1.7, 06.05.2013

Installation Manual

Analog Input Module AI-24

Channel 01-16: PT1000
Channel 17-24: 0-10VDC

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Digital Input Module DI-24

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Digital Output Module DO-8

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MBS
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1 2 3 4 5 6 7 8

1
0
Auto

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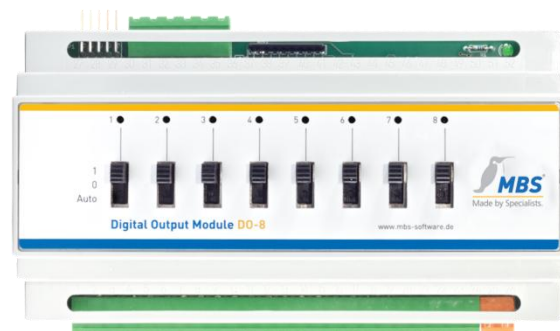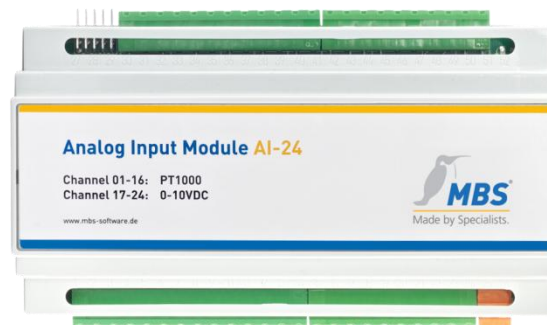
List of Contents

1 Revision History

This table shows the revision history of this document.

Date	Author	Changes
10.01.2009	Frank Schubert	**Revision 1.0** Initial version
26.11.2010	ANE	**Revision 1.1** Change of Connector Assignment Swap GND and +9..25V
21.12.2010	ANE	**Revision 1.2** Fix text current source Remove UBR-01 link chapter 11.4
12.01.2011	ANE	**Revision 1.3** MAC-address min. 1
19.05.2011	ANE	**Revision 1.4** Change RS485 AGND against RS485 GND
11.06.2012	ANE	**Revision 1.5** Change RS485 termination connector
05.11.2012	ANE	**Revision 1.6** Fix value power consumption
06.05.2013	ANE	**Revision 1.7** Change connection drawing

2 Welcome to the BACnet I/O Modules

2.1 General Information

Thank you for purchasing the BACnet I/O modules!
These devices are designed for highly reliable and easy-to-install digital input and output and analog input functions in BACnet networks.

2.2 Key features

Supported BACnet Data-Link-Layers: MS/TP Master and Slave mode
Device Profile: B-ASC functionality in Master mode
                   B-SA functionality in Slave mode

AI-24:   16 channels PT1000, 8 channels 0-10V
DI-24:   24 channels isolated digital input
DO-8:   8 channels digital relay output (1250W per channel)

2.3 Other BACnet products from MBS

Universal BACnet Router UBR-01: High performance router between the BACnet layers BACnet/IP, BACnet/Ethernet and MS/TP. Provides a configuration mode for the MS/TP I/O modules using the integrated web-server.

BACnet OPC-Server: The industries leading software to bridge the gap between BACnet-networks and OPC-Client stations.

BACnet OPC-Client: Connect to OPC-Server and provide the data as a BACnet-Server.

BACnet Universal-Gateways: Connect other communication protocols to BACnet, or connect BACnet devices to other communication protocols.

BACnet Test Framework: Test your devices on conformance to BACnet, use it as a project tool to perform script-based testing on key-names, description-texts or create project-documentations or use this software for your companies' quality assurance process.

BACnet Trainings and Consulting: Learn the basics of BACnet, specifying BACnet projects or learn how to develop BACnet implementations.

BACnet Data-logger: Log- and analyze your BACnet-network traffic within your project.

BACnet Data-server: Control and monitor the energy efficiency or provide remote access to your BACnet-project.

BACnet Protocol stacks: From small MS/TP implementations up to large B-BC BACnet/IP devices, our highly efficient and reliable BACnet protocol stack **BAC-App** supports easy BACnet development.

2.4 Product Support

Our product support is available from

Monday – Friday 9.00 a.m. – 4.00 p.m. MET/MEST

(except public holidays).

Telephone:	+49 / 21 51 / 72 94 – 0
Telefax:	+49 / 21 51 / 72 94 – 50
E-Mail:	support@mbs-software.de
Homepage:	www.mbs-software.de

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3 Introduction

The product line BACnet I/O modules provides three different modules for digital input and output and analog input.

3.1 Module AI-24

This module provides 16 channels PT1000, resolution 0,5°C, temperature range -30 to +150 °C and 8 channels 0-10V, resolution 0,1V.
Power-connection: 9-25V AC/DC, 1,5W

3.2 Module DI-24
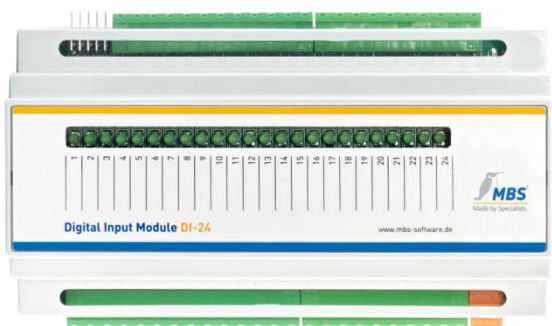
This module provides 24 channels isolated digital input.
One LED per channel displays the channel status.
Power-connection: 9-25V AC/DC, 4,5W

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3.3 Module DO-8
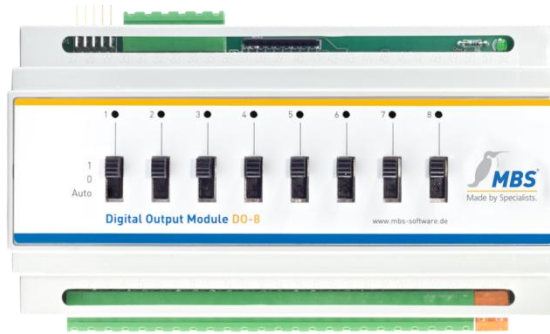
This module provides 8 channels digital output, 1250W each.
Manual override switches allow overriding the output.
One LED per channel displays the channel status.
Power-connection: 9-25V AC/DC, 5W

3.4 Common functionality of all modules

All modules support the following functionality:

- BACnet MS/TP Master and Slave mode (selectable)

- Baud rate: 9600, 19200, 38400, 76800 (selectable)

- Device Profile: B-ASC functionality in Master mode
                     B-SA functionality in Slave mode

- RxD/TxD Activity LEDs

- Power LED

- DIN rail mounting (TS35)

4 Connectors and Control Elements

The following picture shows the front panel of the I/O Modules.

Configuration Jumper   Screw Connectors part 2   Power LED

TxD LED   RxD LED

Screw Connectors part 1   DIN rail release clamp
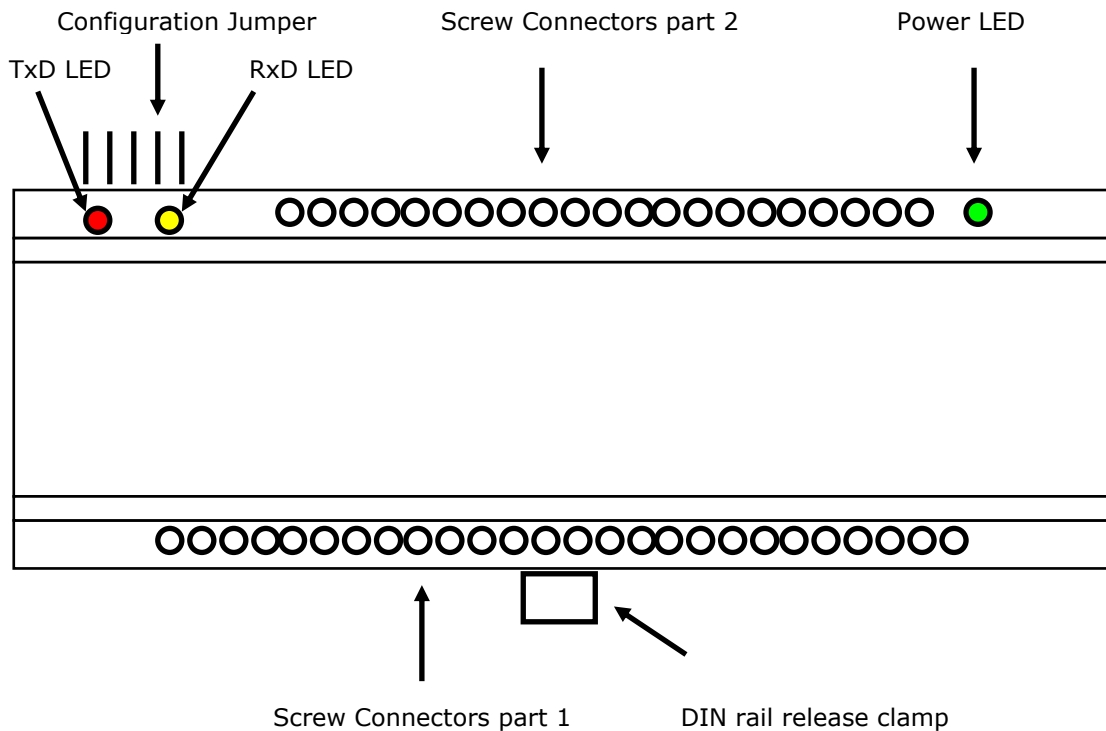
4.1 LED

The I/O modules provide 3 LED (Light Emitting Diodes) to display the system status.

1. MS/TP TxD: This red LED flashes, when the module transmits data on the MS/TP network.

2. MS/TP RxD: This yellow LED flashes, when the module receives data from the MS/TP network.

3. Power: This green LED shows the status of the power connection.

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4.2 Digital Input Module Channel Display

The DI-24 module provides 24 LED to display the channel input-state.
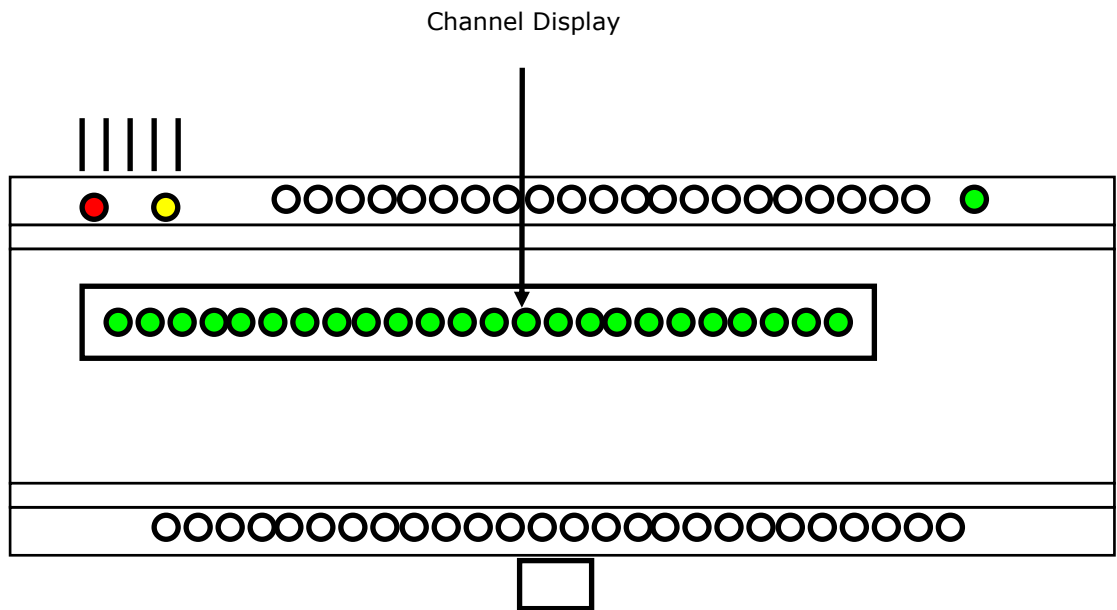
Channel Display

The Channel Display shows the state of each channel by green LED.

If the LED is OFF, the digital input of the associated channel is inactive.

If the LED flashes in green color, the digital input of the associated channel is active.

The order of the channels is 1-24 from left to right.

4.3 Digital Output Module Manual Switches

The DO-8 module provides 8 switches for manual override.
Additionally the DO-8 module provides 8 LED to display the channel output-state.
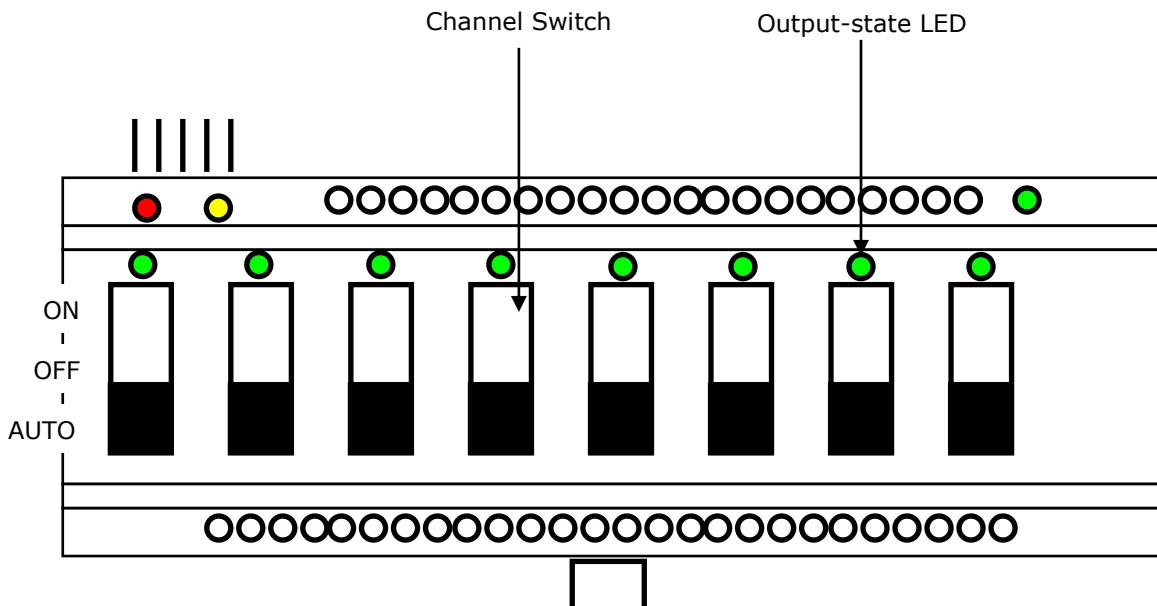
The Channel Switches allow manual override of the output channels.

Each switch may be set into one of the 3 states:

AUTO: In this state the output is controlled over BACnet.

OFF: This state overrides the output to OFF.

ON: This state overrides the output to ON.

The order of the channels is 1-8 from left to right.

The output-state LED is ON (green) when the output is set to active.

The polarity may be changed by writing to the polarity property of the respective channel.

Please note that overriding the output causes the BACnet priority 1 (highest possible priority) set to the manual override state (manual OFF or ON) and the channel is no longer controlled over BACnet, unless switched back to AUTO.

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5 Installation

5.1 Mounting the modules

The modules come with an integrated DIN rail mounting (TS 35mm) and can be easily snapped to the DIN rail. Place the module from the top side to the upper side of the rail and lock it by pressing the lower part of the module against the rail.

Pull max. 3mm
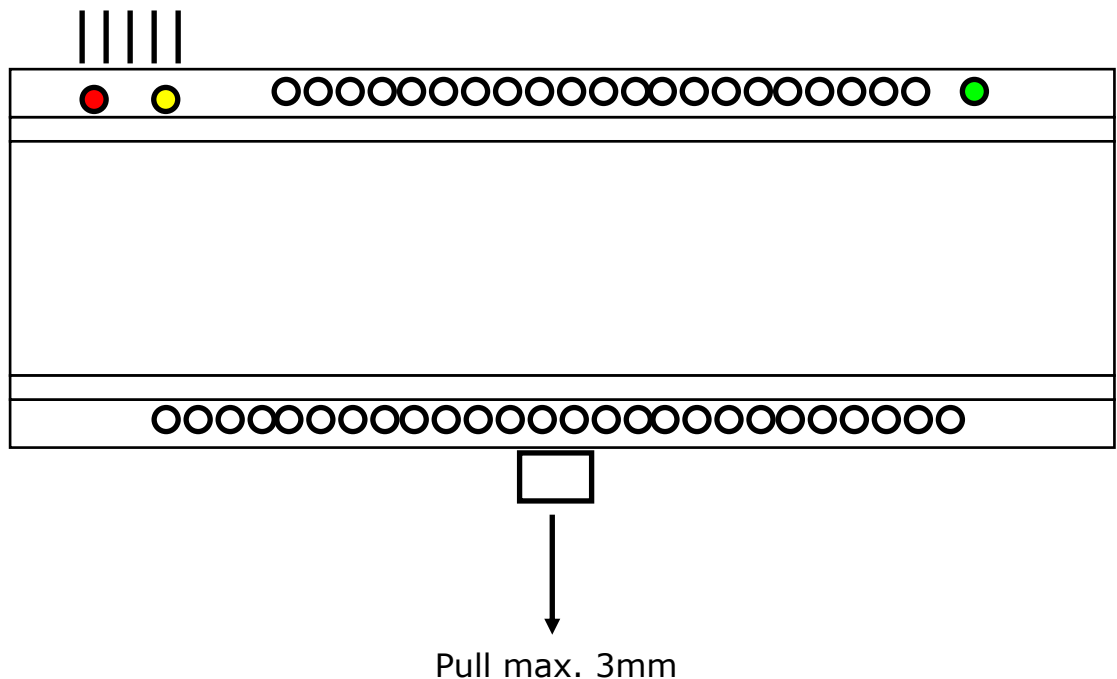
To unlock the module pull the DIN rail release clamp located at the bottom of the module and pull the lower side of the module towards you. Lift the module upwards to release the upper side from the rail.

Attention: Pull the release clamp carefully (max. 3mm) otherwise the plastic part may be damaged!

5.2 Required tools for installation

To install the modules you will need the following tools:

- **Screwdriver flat approx. 3 mm** (included in the package)
- **Configuration Jumpers 5 pcs.** (included in the package)
- **This manual** (included in package)
- **120 Ohms termination resistor** (included in package)

5.3 Electrical installation

Connect the input or output channels to the module, connect the module to the MS/TP network and attach the module to a power-supply, which meets the technical specifications. International power-supply is provided as an option module. Warranty will be void, if the modules will be connected to a power-supply outside the technical specifications.
Warranty will be void, if the module case is opened.
No user-accessible parts inside.

Follow the installation requirements of VDE100 and equivalent electrical specifications for cabinet mounting and installations.

5.4 Special instructions for AI-24 modules

Connecting 0-10V signal conductors requires connecting the signal minus (common potential) to the GND connector of the I/O module and the positive potential to the signal input of the I/O module. A wrong connection of the signal conductors leads to wrong values in measurement.

5.5 Special instructions for DI-24 modules

Only potential-free contacts (shutter contacts) shall be connected to the I/O modules. A power supply connected to the input destroys the opto-couplers. The common power supply provided by the module is 12VDC.

Warranty will be void, if other power supply are connected to the digital inputs!

5.6 Special instructions for DO-8 modules

A maximum of 5Amperes at 250VAC may be applied to the digital output. If you need to switch higher switching capacity, install electrical switches with higher capacities.

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6 MS/TP wiring

MS/TP Verkabelung / MS/TP Wiring

Max. length of segment: 1.200m (4.000 ft)
Max no. of devices per segment: 32
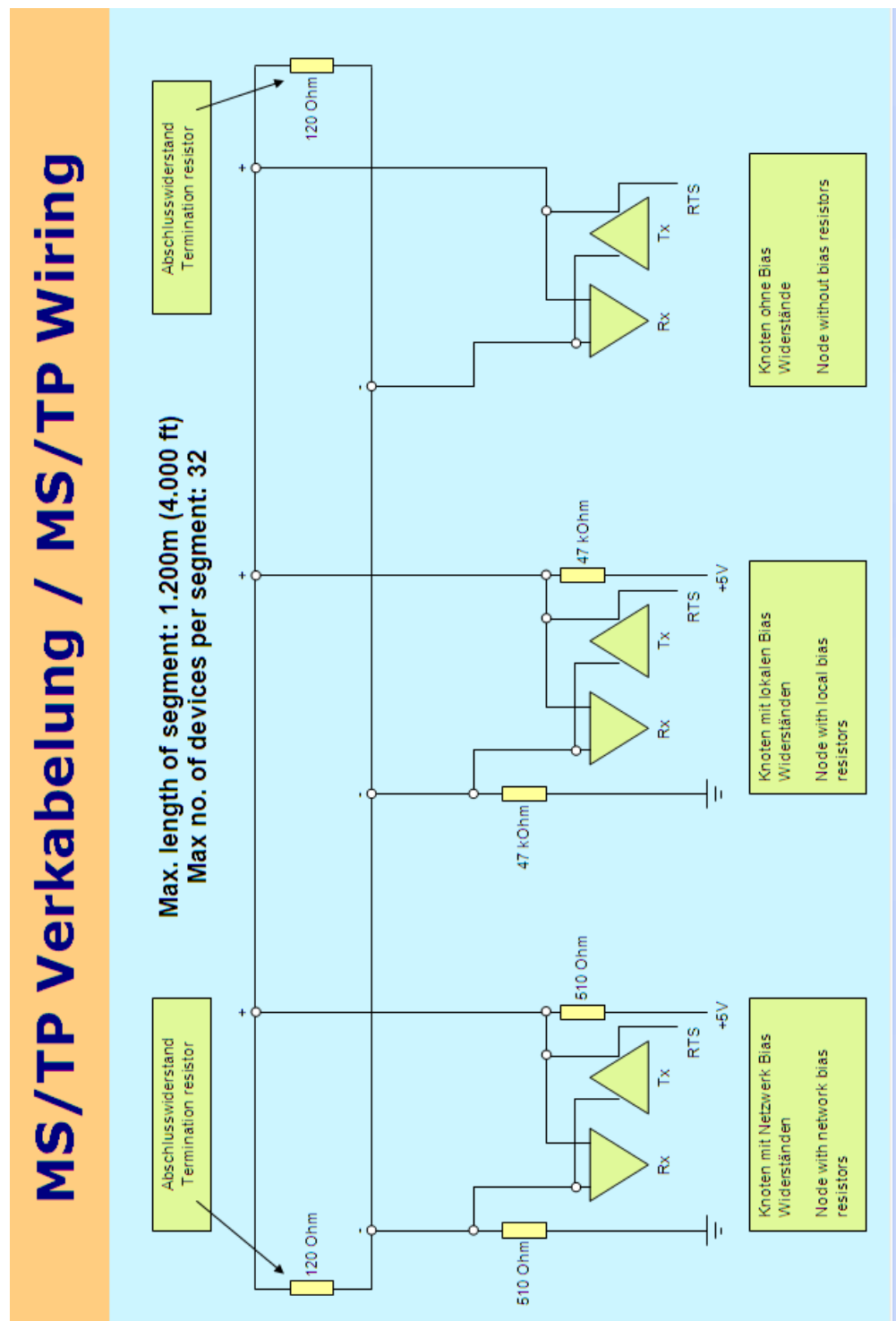
BACnet MS/TP networks follow the wiring specifications shown above. A separate MS/TP training document is available from MBS.

The bus structure does not allow T-connections, both ends of the bus require bus termination (120 Ohms resistor between conductors).

7 AI-24 Connector Assignment

30   to   51

1   to   26
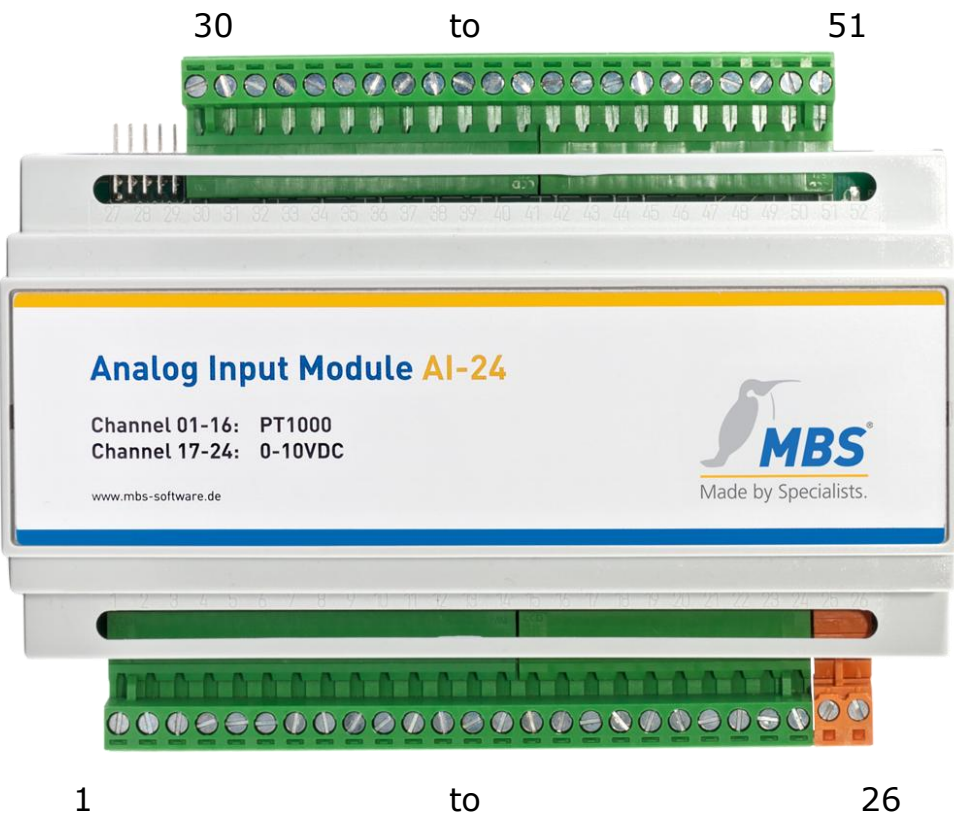
Connector no.	Description	Connector no.	Description
1	AI 1 / PT1000	27	Not assigned
2	AI 1 / PT1000	28	Not assigned
3	AI 2 / PT1000	29	Not assigned
4	AI 2 / PT1000	30	AI 11 / PT1000
5	AI 3 / PT1000	31	AI 11 / PT1000
6	AI 3 / PT1000	32	AI 12 / PT1000
7	AI 4 / PT1000	33	AI 12 / PT1000
8	AI 4 / PT1000	34	AI 13 / PT1000
9	AI 5 / PT1000	35	AI 13 / PT1000
10	AI 5 / PT1000	36	AI 14 / PT1000
11	AI 6 / PT1000	37	AI 14 / PT1000
12	AI 6 / PT1000	38	AI 15 / PT1000
13	AI 7 / PT1000	39	AI 15 / PT1000
14	AI 7 / PT1000	40	AI 16 / PT1000
15	AI 8 / PT1000	41	AI 16 / PT1000
16	AI 8 / PT1000	42	AI 17 / 0-10VDC +
17	AI 9 / PT1000	43	AI 18 / 0-10VDC +
18	AI 9 / PT1000	44	AI 19 / 0-10VDC +
19	AI 10 / PT1000	45	AI 20 / 0-10VDC +
20	AI 10/ PT1000	46	0-10VDC – (GND)
21	MS/TP RS485 GND	47	0-10VDC – (GND)
22	MS/TP RS485 Signal A	48	AI 21 / 0-10VDC +
23	120 Ohms Termination	49	AI 22 / 0-10VDC +
24	MS/TP RS485 Signal B	50	AI 23 / 0-10VDC +
25	+9...+25V	51	AI 24 / 0-10VDC +
26	GND		

To terminate the RS485 network connect pin 23 and pin 24.

Connection Diagram:

GND

GND

0-10VDC

AI24
+

0-10VDC

AI18
+

0-10VDC

AI17
+

AI16

PT 1000

AI16

AI2

PT 1000

AI2

AI1

PT 1000

AI1
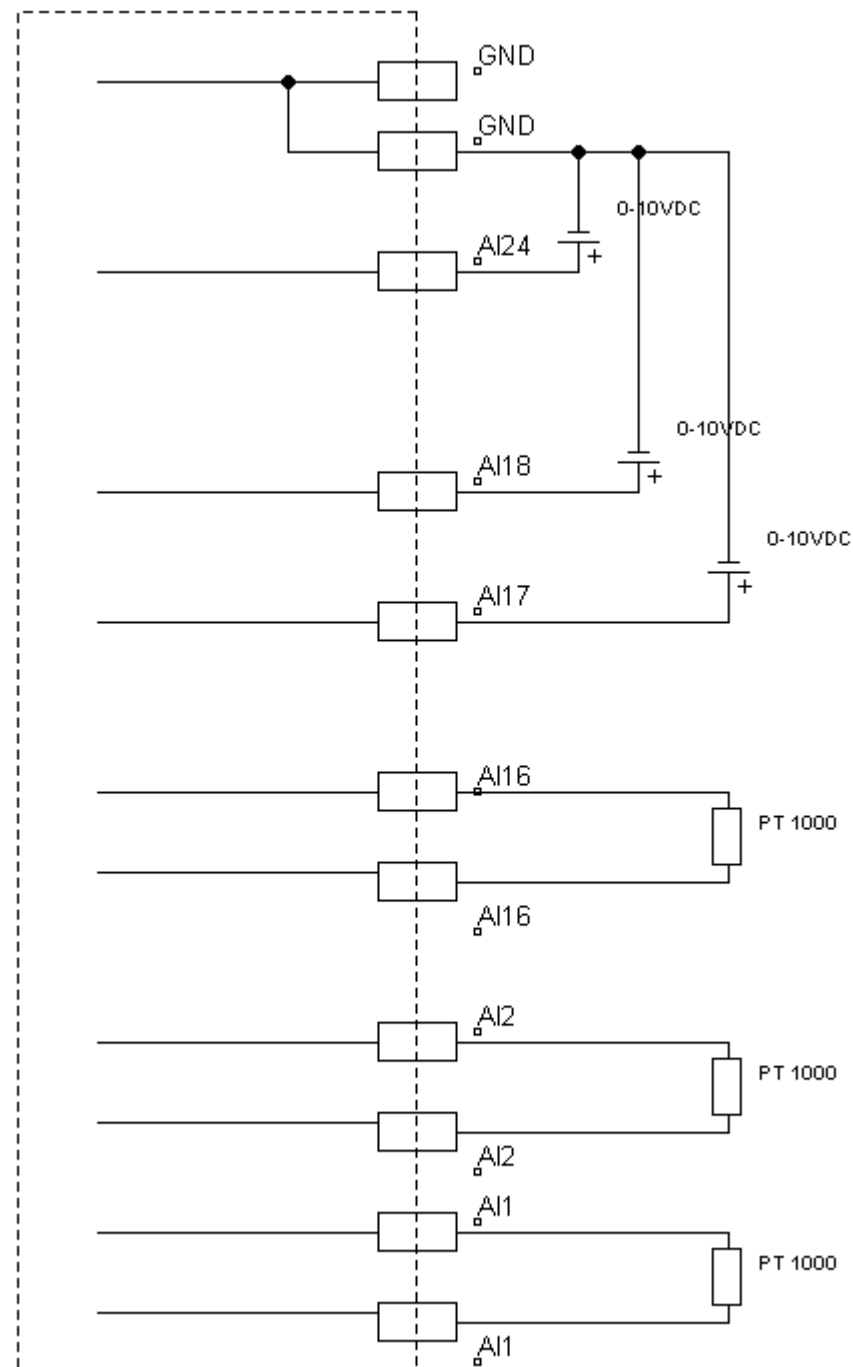
8 DI-24 Connector Assignment

30   to   51

1   to   26
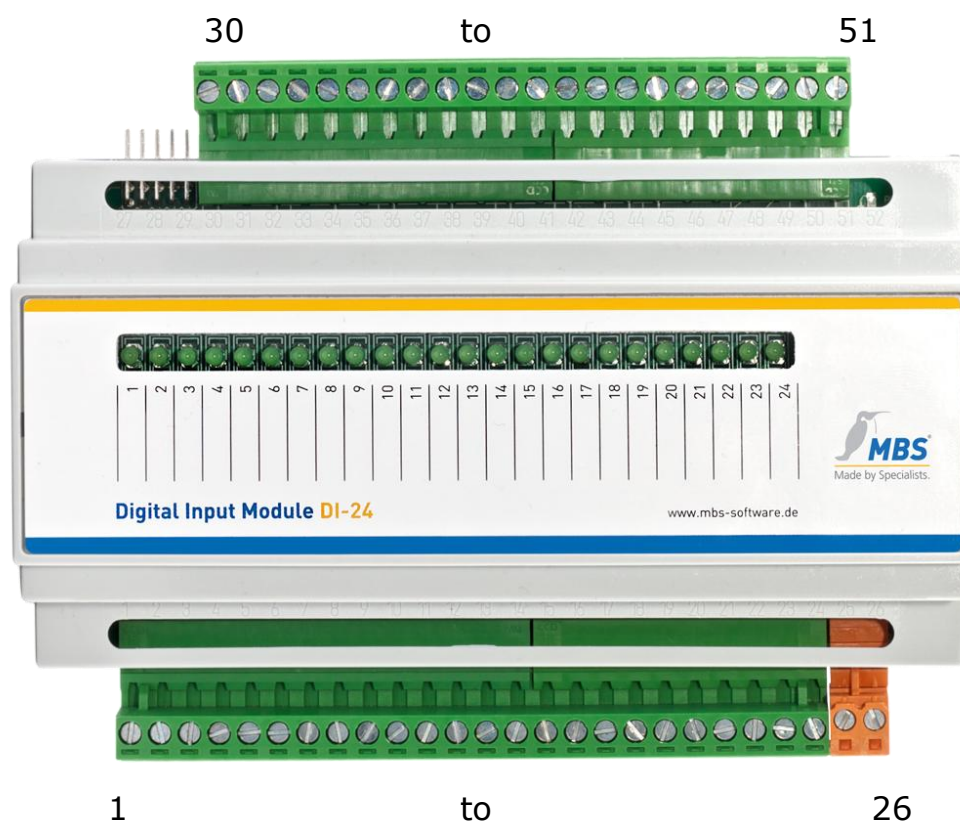
Connector no.	Description	Connector no.	Description
1	Digital Input1	27	Not assigned
2	COM*	28	Not assigned
3	Digital Input2	29	Not assigned
4	COM	30	Digital Input11
5	Digital Input3	31	COM
6	COM	32	Digital Input12
7	Digital Input4	33	Digital Input13
8	COM	34	COM
9	Digital Input5	35	Digital Input14
10	COM	36	Digital Input15
11	Digital Input6	37	COM
12	COM	38	Digital Input16
13	Digital Input7	39	Digital Input17
14	COM	40	COM
15	Digital Input8	41	Digital Input18
16	COM	42	Digital Input19
17	Digital Input9	43	COM
18	COM	44	Digital Input20
19	Digital Input10	45	Digital Input21
20	COM	46	COM
21	MS/TP RS485 GND	47	Digital Input22
22	MS/TP RS485 Signal A	48	Digital Input23
23	120 Ohms Termination	49	COM
24	MS/TP RS485 Signal B	50	Digital Input24
25	+9...+25V	51	COM
26	GND		

COM specifies the power supply of all isolated digital inputs (12VDC).
Don't connect any outside power supply to the isolated inputs, this may destroy the opto-couplers!
To terminate the RS485 network connect pin 23 and pin 24.

Connection Diagram:
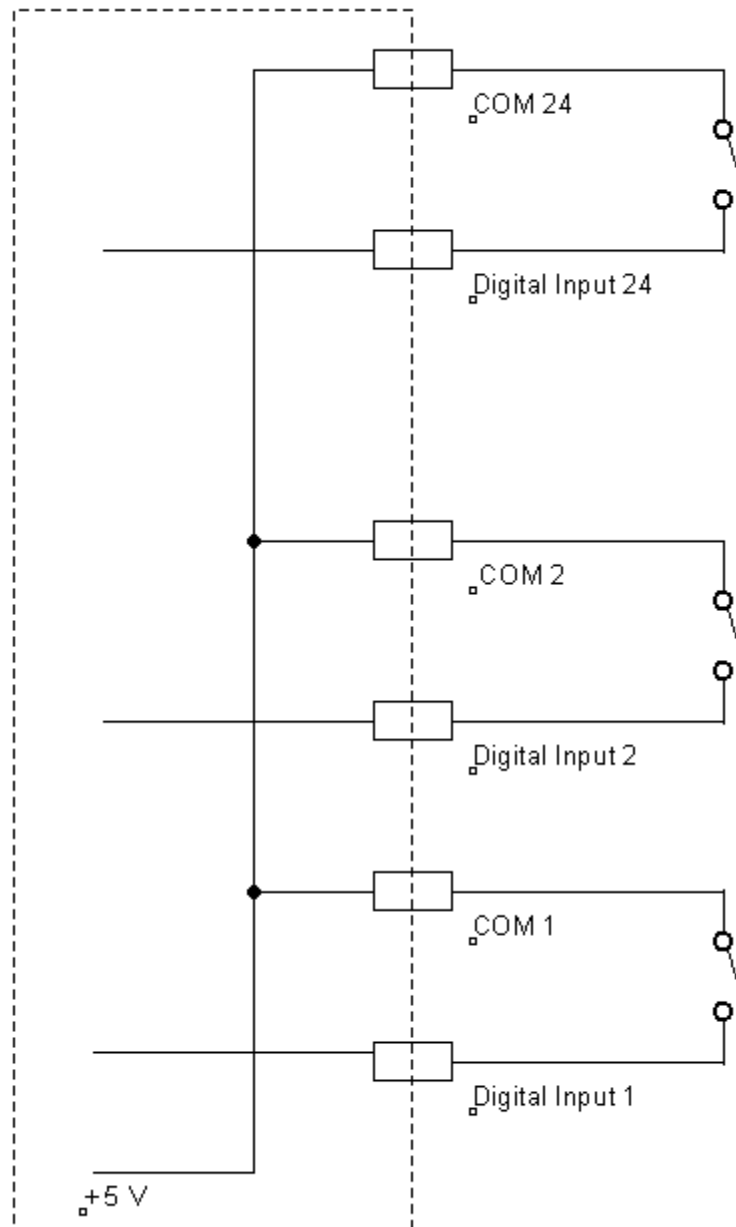
9 DO-8 Connector Assignment

30 to 35

1 to 26
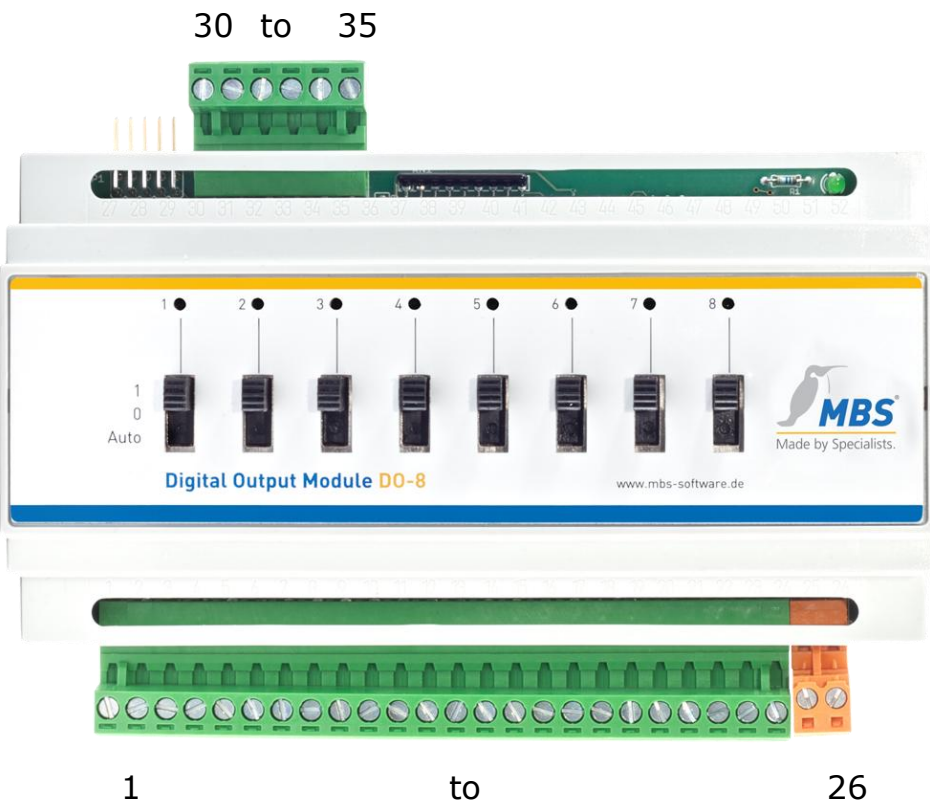
Connector no.	Description	Connector no.	Description
1	DO1-4*	19	Not assigned
2	DO1-1*	20	Not assigned
3	DO1-2*	21	MS/TP RS485 GND
4	DO2-4	22	MS/TP RS485 Signal A
5	DO2-1	23	120 Ohms Termination
6	DO2-2	24	MS/TP RS485 Signal B
7	DO3-4	25	+9...+25V
8	DO3-1	26	GND
9	DO3-2	27	Not assigned
10	DO4-4	28	Not assigned
11	DO4-1	29	Not assigned
12	DO4-2	30	DO7-2
13	DO5-4	31	DO7-1
14	DO5-1	32	DO7-4
15	DO5-2	33	DO8-2
16	DO6-4	34	DO8-1
17	DO6-1	35	DO8-4
18	DO6-2		

Max. switching capacity per channel: 1250VA (5A@250VAC)

DO1-2*

DO1-1*

DO1-4*

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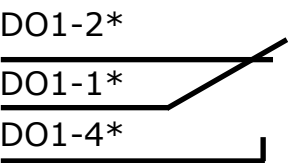
Connector 1 of each channel: Common connector
Connector 2 of each channel: Break contact connector
Connector 4 of each channel: Shutter contact connector
To terminate the RS485 network connect pin 23 and pin 24.

10 Configuring the I/O module

The integrated jumpers are used to program the modules.
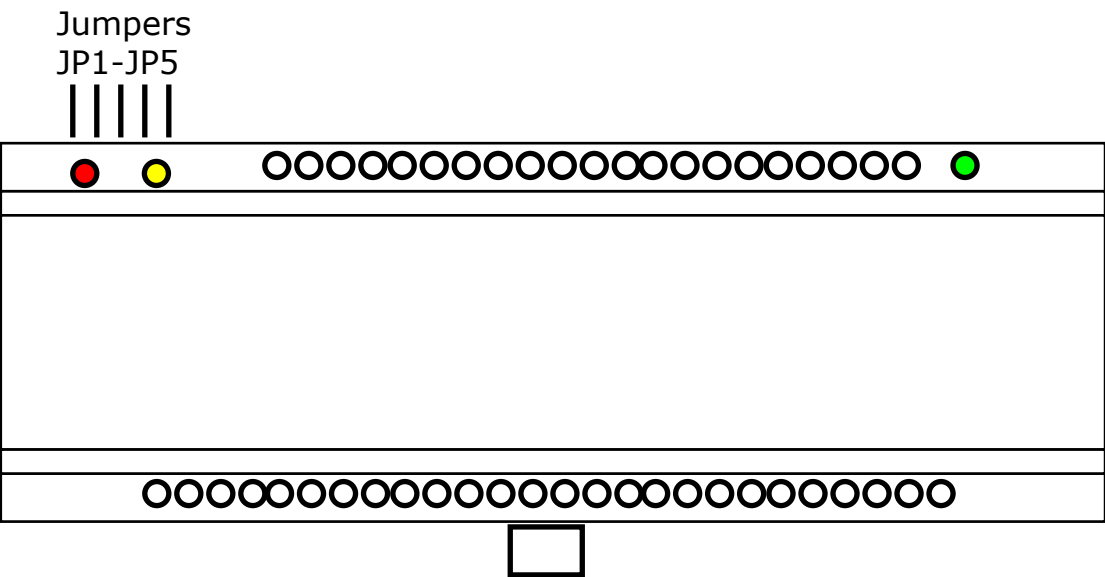
Jumpers
JP1-JP5

All following pictures showing the jumper settings are seen from the top/upper side view of the module.

J J J J J
1 2 3 4 5

Screw-connectors
part 2

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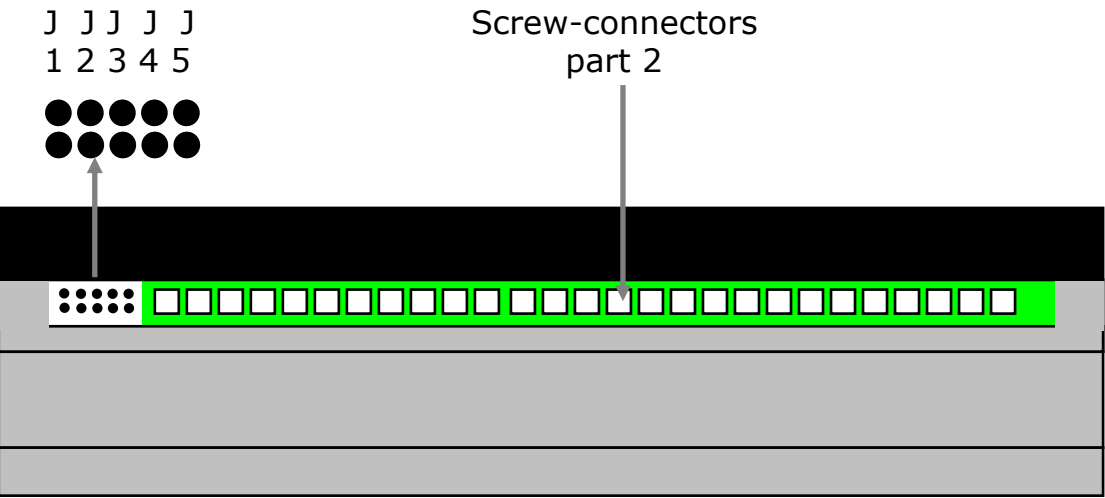
10.1 Using the jumpers for configuration

The pictures in the following chapters follow two conventions for setting the jumpers.

10.1.1 Set the configuration mode

The configuration mode is setup using the jumpers in vertical direction.

```
J  J  J  J  J
1  2  3  4  5
```
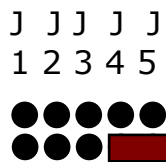
This example shows the configuration mode "baud rate", to enter this mode, J4 and J5 are connected (bridged).

10.1.2 Set the configuration

The configuration is setup using the jumpers in horizontal direction.

```
J  J  J  J  J
1  2  3  4  5
```
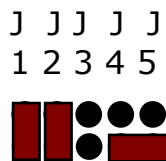
This example shows the configuration for baud rate 76800 bit/s, to setup this baud rate, J1 and J2 are set.

10.1.3 The programming steps

The programming of the module is performed by following these steps:

Step 1:   Disconnect the power supply.
Step 2:   Set the jumpers according to the intended setting.
Step 3:   Connect the power supply.
Step 4:   Check the setting by watching the TxD LED.
Step 5:   Disconnect the power supply.
Step 6:   Remove ***ALL*** jumpers.
Step 7:   Connect the power supply again to set the module into operating mode (run mode) back again.

Important: **Never assign any jumper while in run mode, in run mode all jumpers shall be removed!**

10.2   Setting the baud rate

This chapter shows how to configure the baud rate of the module, the default baud rate is 9600 bit/s.

10.2.1   Selecting the setup mode baud rate

To setup the baud rate bridge the jumpers J4 and J5.

```
J J J J J
1 2 3 4 5
```
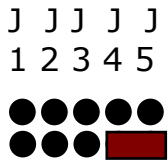

10.2.2   Selecting the desired baud rate

The desired baud rate is configured using jumpers J1 and J2.

baud rate 9600 bit/s (J1 and J2 not set)
```
J J J J J
1 2 3 4 5
```
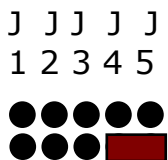

baud rate 19200 bit/s (J1 set, J2 not set)
```
J J J J J
1 2 3 4 5
```
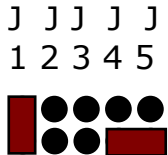

baud rate 38400 bit/s (J1 not set, J2 set)
```
J J J J J
1 2 3 4 5
```
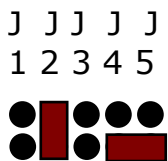

baud rate 76800 bit/s (both J1 and J2 set)
```
J J J J J
1 2 3 4 5
```

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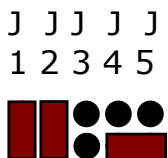
10.2.3 Checking the baud rate

After applying the power supply, watch the red TxD LED to check, if the baud rate was correctly setup.

9600 bit/s:	TxD LED flashes 1 pulse / second
19200 bit/s:	TxD LED flashes 2 pulses / second
38400 bit/s:	TxD LED flashes 3 pulses / second
76800 bit/s:	TxD LED flashes 4 pulses / second

10.3   Resetting the module to default values

This chapter shows how to reset the module back to default values.

10.3.1   Selecting the reset mode

To setup the reset mode bridge the jumpers J2 and J3.

```
J J J J J
1 2 3 4 5
```
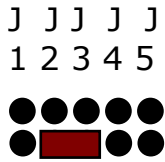

10.3.2   Checking the reset

After performing the reset the TxD LED flashes 5 pulses / second.

The default values are:

MS/TP MAC-address:	1
BACnet Device-Id:	0
Baud rate:	9600 bit/s
Unsolicited COV:	disabled

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10.4   Setup the MAC-address of the module

This chapter shows how to setup the MAC-address of the module.

10.4.1   Operating modes MS/TP master and slave

The BACnet I/O modules may run in MS/TP master mode as well as in slave mode.

MAC-addresses of MS/TP master nodes are in the range of 0-127, slave nodes are in the range of 128-254 (the capability of assigning slave addresses below 128 is not supported by the I/O modules).

The MAC-address for master nodes can be setup within the range from 0-31 and for slave nodes within the range from 128 to 135 only when using the jumpers. Other BACnet MAC-addresses can be setup by writing to a proprietary property of the device object.

In MS/TP master mode, the module supports the BACnet Device Profile B-ASC (Application Specific Controller). In slave mode the module is passive and supports only the BACnet Device Profile B-SA (Smart Actuator).

The BACnet device instance number of the module is set according to the MAC-address, when configured using the jumpers.

Please note that in slave mode the module cannot be detected automatically in the BACnet network using the broadcast messages "Who-Is" and "I-Am".

Please note if the MS/TP address is changed by reconfiguration via jumpers the device instance number and the object name are changed back to their default values.

10.4.2   Selecting the operating mode MS/TP master

To set the module into master mode and to setup the MAC-address for the master no jumper shall be bridged.

```
J  J J  J  J
1 2 3 4 5
●●●●●
●●●●●
```

10.4.3   Selecting the desired master MAC-address

The desired master MAC-address is configured using all jumpers from J1 to J5.

The address is setup using the binary encoding of the jumpers, J1 represents Bit 0, J2 Bit 1, J3 Bit 2, J4 Bit 3 and J5 Bit 4.

Please note that address 0 cannot be set.

MAC-address 1

```
J  J J  J  J
1 2 3 4 5
```

MAC-address 2

```
J  J J  J  J
1 2 3 4 5
```

MAC-address 3

```
J  J J  J  J
1 2 3 4 5
```

MAC-address 4

```
J  J J  J  J
1 2 3 4 5
```

… etc. follow the binary encoding of the jumpers

MAC-address 29

J J J J J
1 2 3 4 5

MAC-address 30

J J J J J
1 2 3 4 5

MAC-address 31

J J J J J
1 2 3 4 5

MAC-addresses in the range from 32 to 127 can only be setup by writing to the MAC-address property of the device object.

10.4.4   Checking the master MAC-address

After setting the master MAC-address the TxD LED flashes 7 pulses / second.

10.4.5   Selecting the operating mode MS/TP slave

To set the module into slave mode and to setup the MAC-address for the slave bridge the jumpers J1 and J2.

```
J  J J  J  J
1 2 3 4 5
```

10.4.6   Selecting the desired slave MAC-address

The desired slave MAC-address is configured using the jumpers J3, J4 and J5.
The address is setup using the binary encoding of the jumpers, J3 represents Bit 0, J4 Bit 1, J5 Bit 2.

MAC-address 128
```
J  J J  J  J
1 2 3 4 5
```

MAC-address 129
```
J  J J  J  J
1 2 3 4 5
```

MAC-address 130
```
J  J J  J  J
1 2 3 4 5
```
MAC-address 131
```
J  J J  J  J
1 2 3 4 5
```

MAC-address 132
```
J  J J  J  J
1 2 3 4 5
```

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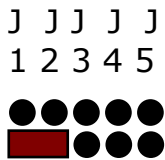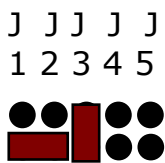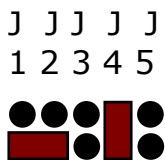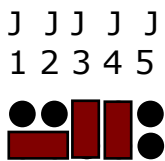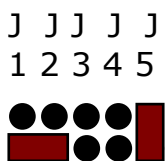
MAC-address 133

```
J  J J  J  J
1 2 3 4 5
```


MAC-address 134

```
J  J J  J  J
1 2 3 4 5
```

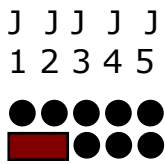

MAC-address 135

```
J  J J  J  J
1 2 3 4 5
```


MAC-addresses in the range from 135 to 254 can only be setup by writing to the MAC-address property of the device object.

10.4.7   Checking the slave MAC-address

After setting the slave MAC-address the TxD LED flashes 6 pulses / second.

11 Setup using BACnet properties

The configuration settings may be setup using the BACnet WriteProperty service and can be read from the module using the BACnet ReadProperty service.

11.1 Setting the baud rate

The baud rate can be set by writing the desired baud rate value to the proprietary property 701 of the device object.

The data type is UNSIGNED and possible values are: 9600, 19200, 38400, 76800.

The value is evaluated and permanently set to the module after a restart. The restart may be performed by switching the power supply off and on again or by issuing a BACnet ReinitializeDevice command to the module.

11.2 Setting the MAC-address

The MS/TP MAC-address of the module can be set by writing the desired address to the proprietary property 702 of the device object.

The data type is UNSIGNED and possible values are in the range between 0 and 254.

Master nodes addresses are in the range from 0-127, slave node addresses are in the range from 128-254.

The value is evaluated and permanently set to the module after a restart. The restart may be performed by switching the power supply off and on again or by issuing a BACnet ReinitializeDevice command to the module.

11.3 Enabling COV-Unsolicited

Unsolicited COV (Broadcast Change-of-Value notification) can be enabled or disabled by writing the desired COV-U mode to the proprietary property 700 of the BACnet object associated to the desired channel.

The data type is BOOLEAN and possible values are: FALSE (no COV-U) or TRUE (COV-U active).

The value is evaluated and permanently set to the module after a

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restart. The restart may be performed by switching the power supply off and on again or by issuing a BACnet ReinitializeDevice command to the module.

11.4   Other writable properties

The BACnet PICS document (Protocol Implementation Conformance Statement) of the I/O modules shows the list of writable properties and the possible range of these properties.

Annex

Technical Specifications
BACnet PICS

12 Technical Specifications

All modules:
- Power-supply 9-25V AC/DC
- CPU ATMEL AT89S8253
- 1 x serial port EIA-485 BACnet MS/TP (B+, A-, AGND)
- Screw connectors 3mm screw-size, max. 2,5mm² wire
- Power-LED, green
- RxD LED, yellow
- TxD LED, red
- Weight: <500g
- Dimensions: height: 91mm, width: 155mm, depth: 60mm (including DIN-rail mounting)
- Environmental temperature range: 0...45°C, 32…113°F
- Environmental humidity range: 20...80 percent-relative-humidity, non condensing

AI-24:
16 channels PT1000, resolution 0,5°C, range -30°C…+150°C, power consumption 1.5 W

DI-24:
24 channels isolated digital input, 12VDC provided as common supply source, green input-state LED per channel, power consumption 4.5 W

DO-8:
8 channels digital relay output, max. load 1250W (5A@250VAC) per channel, manual override switch (states AUTO, OFF, ON), green output-state LED per channel

Manufacturer:
MBS GmbH
Roemerstrasse 15
D-47809 Krefeld
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This product is available as an OEM product, please call.

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13 BACnet PICS AI-24

Date:	11. 01.2009
Vendor Name:	MBS GmbH
Product Name:	BACnet I/O module AI-24
Product Model Number:	AI-24
Application Software Version:	1.0
Firmware Revision:	1.0
BACnet Protocol Version:	1
BACnet Protocol Revision:	4

Product Descrip tion:
The MBS AI-24 module is a highly reliable BACnet Analog-Input module supporting 16 channels PT1000 and 8 channels 0-10V analog input.

The module supports all standardized BACnet MS/TP baud rates from 9600 up to 76800 bit/s. The modules may run in MS/TP master and slave mode.

BACnet Standardized Device Profile (Annex L):
☐ **BACnet Operator Workstation (B-OWS)**
☐ **BACnet Building Controller (B-BC)**
☐ **BACnet Advanced Application Controller (B-AAC)**
☑ **BACnet Application Specific Controller (B-ASC)**
☐ **BACnet Smart Sensor (B-SS)**
☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B	Data Sharing-ReadProperty-B
DS-WP-B	Data Sharing-WriteProperty-B
DS-COVU-B	Data Sharing-ChangeofValue Unsolicited-B
DM-DDB-B	Device Management-DynamicDeviceBinding-B
DM-DOB-B	Device Management-DynamicObjectBinding-B
DM-DCC-B	Device Management-DeviceCommunicationControl-B
DM-RD-B	Device Management-ReinitializeDevice-B

The fixed password for DeviceCommunicationControl and ReinitializeDevice services is: "BACnet-MBS-GmbH" encoded in the ANSI X3.4 character set.

Segmentation Capability:
☐ Segmented requests supported   Window Size: -
☐ Segmented responses supported   Window Size: -

Data Link Layer Options:
☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8) baud rate(s) _____
☑ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☑ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

☐   Point-To-Point, EIA 232 (Clause 10)   baud rate(s) _____

☐   Point-To-Point, modem, (Clause 10)   baud rate(s) _____

☐   LonTalk, (Clause 11) medium:_____

☐   Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)

☐   Yes

☑   No

Networking Options:

☐   Router, Clause 6

☐   Annex H, BACnet Tunneling Router over IP

☐   BACnet/IP Broadcast Management Device (BBMD)
     ☐   Does the BBMD support registrations by Foreign Devices?

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☑   ANSI X3.4

☐   IBM™/Microsoft™ DBCS

☐   ISO 8859-1

☐   ISO 10646 (UCS-2)

☐   ISO 10646 (UCS-4)

☐   JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

No gateway functionality yet.

Remarks:

If set to slave mode, the supported Device Profile is reduced to B-SA.

The BIBB DS-COV-U-B is not supported in slave mode.

The BIBB DM-DCC-B supports infinite lifetime only.

The BIBB DM-RD-B supports both cold-start and warm-start.

The BIBBS DM-DCC-B and DM-RD-B are supported with the optional password only. The fixed password is: "BACnet-MBS-GmbH".

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Standard Object Types Supported:

The supported object-types are DEVICE (**BACnetObjectType** ::= ENUMERATED 8) and Analog-Input (**BACnetObjectType** ::= ENUMERATED 0).
Creation and Deletion of objects is not supported.

Device Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier	R	W
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
System_Status	BACnetDeviceStatus	R	R
Vendor_Name	CharacterString	R	R
Vendor_Identifier	Unsigned16	R	R
Model_Name	CharacterString	R	R
Firmware_Revision	CharacterString	R	R
Application_Software_Version	CharacterString	R	R
Location	CharacterString	O	-
Description	CharacterString	O	-
Protocol_Version	Unsigned	R	R
Protocol_Revision	Unsigned	R	R
Protocol_Services_Supported	BACnetServicesSupported	R	R
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R	R
Max_APDU_Length_Accepted	Unsigned (max. 50)	R	R
Segmentation_Supported	BACnetSegmentation	R	R
Max_Segments_Accepted	Unsigned	O	-
VT_Classes_Supported	List of BACnetVTClass	O	-
Active_VT_Sessions	List of BACnetVTSession	O	-
Local_Time	Time	O	-
Local_Date	Date	O	-
UTC_Offset	INTEGER	O	-
Daylight_Savings_Status	BOOLEAN	O	-
APDU_Segment_Timeout	Unsigned	O	-
APDU_Timeout	Unsigned (10.000 ms)	R	R
Number_Of_APDU_Retries	Unsigned (5)	R	R
List_Of_Session_Keys	List of BACnetSessionKey	O	-
Time_Synchronization_Recipients	List of BACnetRecipient	O	-
Max_Master	Unsigned (127)	O	R
Max_Info_Frames	Unsigned (1)	O	R
Device_Address_Binding	List of BACnetAddressBinding (empty)	R	R
Database_Revision	Unsigned (1)	R	R
Configuration_Files	BACnetARRAY[N] of BACnetObjectIdentifier	O	-
Last_Restore_Time	BACnetTimeStamp	O	-
Backup_Failure_Timeout	Unsigned16	O	-
Active_COV_Subscriptions	List of BACnetCOVSubscription	O	-
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	O	-
Manual_Slave_Address_Binding	List of BACnetAddressBinding	O	-
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	O	-
Slave_Address_Binding	List of BACnetAddressBinding	O	-
Profile_Name	CharacterString	O	-
Baud rate (proprietary 701)	UNSIGNED: 9600, 19200, 38400, 76800	O	W
MAC-address (proprietary 702)	UNSIGNED: 0-127 master, 128-254 slave	O	W

1 = BACnet Conformance Code 135-2004
2 = BACnet Conformance Code AI-24

R = Required + Readable
W = Writable
O = Optional
- = Not supported

Analog-Input Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier (1-24)	R	R
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
Present_Value	REAL	R^1	R^1
Description	CharacterString (max. 16 characters)	O	W
Device_Type	CharacterString (max. 16 characters)	O	W
Status_Flags	BACnetStatusFlags	R	R
Event_State	BACnetEventState	R	R
Reliability	BACnetReliability	O	-
Out_Of_Service	BOOLEAN	R	W
Update_Interval	Unsigned	O	-
Units	BACnetEngineeringUnits	R	W^1
Min_Pres_Value	REAL	O	-
Max_Pres_Value	REAL	O	-
Resolution	REAL	O	-
COV_Increment	REAL	O2	W
Time_Delay	Unsigned	O3	-
Notification_Class	Unsigned	O3	-
High_Limit	REAL	O3	-
Low_Limit	REAL	O3	-
Deadband	REAL	O3	-
Limit_Enable	BACnetLimitEnable	O3	-
Event_Enable	BACnetEventTransitionBits	O3	-
Acked_Transitions	BACnetEventTransitionBits	O3	-
Notify_Type	BACnetNotifyType	O3	-
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp	O3	-
Profile_Name	CharacterString	O	-
DS-COVU-B (proprietary 700)	BOOLEAN: FALSE=no COV, TRUE=COV-U	O	W

R^1	=	Writable if OutOfService is TRUE
W^1	=	Unit is writable for Analog-Input channels no. 17-24 (0-10V inputs), possible values are: 5 (volts) and 124 (millivolts).
1	=	BACnet Conformance Code 135-2004
2	=	BACnet Conformance Code AI-24
R	=	Required + Readable
W	=	Writable
O	=	Optional
-	=	Not supported

14 BACnet PICS DI-24

Date:	11. 01.2009
Vendor Name:	MBS GmbH
Product Name:	BACnet I/O module DI-24
Product Model Number:	DI-24
Application Software Version:	1.0
Firmware Revision:	1.0
BACnet Protocol Version:	1
BACnet Protocol Revision:	4

Product Description:
The MBS DI-24 module is a highly reliable BACnet Digital-Input module supporting 24 channels isolated digital input.

The module supports all standardized BACnet MS/TP baud rates from 9600 up to 76800 bit/s. The modules may run in MS/TP master and slave mode.

BACnet Standardized Device Profile (Annex L):
- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **BACnet Building Controller (B-BC)**
- ☐ **BACnet Advanced Application Controller (B-AAC)**
- ☑ **BACnet Application Specific Controller (B-ASC)**
- ☐ **BACnet Smart Sensor (B-SS)**
- ☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B	Data Sharing-ReadProperty-B
DS-WP-B	Data Sharing-WriteProperty-B
DS-COVU-B	Data Sharing-ChangeofValue Unsolicited-B
DM-DDB-B	Device Management-DynamicDeviceBinding-B
DM-DOB-B	Device Management-DynamicObjectBinding-B
DM-DCC-B	Device Management-DeviceCommunicationControl-B
DM-RD-B	Device Management-ReinitializeDevice-B

The fixed password for DeviceCommunicationControl and ReinitializeDevice services is: "BACnet-MBS-GmbH" encoded in the ANSI X3.4 character set.

Segmentation Capability:
- ☐ Segmented requests supported   Window Size: -
- ☐ Segmented responses supported   Window Size: -

Data Link Layer Options:
- ☐ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8) baud rate(s) _____
- ☑ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- ☑ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

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☐   Point-To-Point, EIA 232 (Clause 10)   baud rate(s) _____
☐   Point-To-Point, modem, (Clause 10)   baud rate(s) _____
☐   LonTalk, (Clause 11) medium:_____
☐   Other: _____

Device Address Binding:
Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.)
☐   Yes
☑   No

Networking Options:
☐   Router, Clause 6

☐   Annex H, BACnet Tunneling Router over IP

☐   BACnet/IP Broadcast Management Device (BBMD)
    ☐   Does the BBMD support registrations by Foreign Devices?

Character Sets Supported:
Indicating support for multiple character sets does not imply that they can all be supported simultaneously.
☑   ANSI X3.4
☐   IBM™/Microsoft™ DBCS
☐   ISO 8859-1
☐   ISO 10646 (UCS-2)
☐   ISO 10646 (UCS-4)
☐   JIS C 6226

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:
No gateway functionality yet.

Remarks:
If set to slave mode, the supported Device Profile is reduced to B-SA.

The BIBB DS-COV-U-B is not supported in slave mode.

The BIBB DM-DCC-B supports infinite lifetime only.

The BIBB DM-RD-B supports both cold-start and warm-start.

The BIBBS DM-DCC-B and DM-RD-B are supported with the optional password only. The fixed password is: "BACnet-MBS-GmbH".

Standard Object Types Supported:

The supported object-types are DEVICE (**BACnetObjectType** ::= ENUMERATED 8) and Binary-Input (**BACnetObjectType** ::= ENUMERATED 3).

Creation and Deletion of objects is not supported.

Device Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier	R	W
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
System_Status	BACnetDeviceStatus	R	R
Vendor_Name	CharacterString	R	R
Vendor_Identifier	Unsigned16	R	R
Model_Name	CharacterString	R	R
Firmware_Revision	CharacterString	R	R
Application_Software_Version	CharacterString	R	R
Location	CharacterString	O	-
Description	CharacterString	O	-
Protocol_Version	Unsigned	R	R
Protocol_Revision	Unsigned	R	R
Protocol_Services_Supported	BACnetServicesSupported	R	R
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R	R
Max_APDU_Length_Accepted	Unsigned (max. 50)	R	R
Segmentation_Supported	BACnetSegmentation	R	R
Max_Segments_Accepted	Unsigned	O	-
VT_Classes_Supported	List of BACnetVTClass	O	-
Active_VT_Sessions	List of BACnetVTSession	O	-
Local_Time	Time	O	-
Local_Date	Date	O	-
UTC_Offset	INTEGER	O	-
Daylight_Savings_Status	BOOLEAN	O	-
APDU_Segment_Timeout	Unsigned	O	-
APDU_Timeout	Unsigned (10.000 ms)	R	R
Number_Of_APDU_Retries	Unsigned (5)	R	R
List_Of_Session_Keys	List of BACnetSessionKey	O	-
Time_Synchronization_Recipients	List of BACnetRecipient	O	-
Max_Master	Unsigned (127)	O	R
Max_Info_Frames	Unsigned (1)	O	R
Device_Address_Binding	List of BACnetAddressBinding (empty)	R	R
Database_Revision	Unsigned (1)	R	R
Configuration_Files	BACnetARRAY[N] of BACnetObjectIdentifier	O	-
Last_Restore_Time	BACnetTimeStamp	O	-
Backup_Failure_Timeout	Unsigned16	O	-
Active_COV_Subscriptions	List of BACnetCOVSubscription	O	-
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	O	-
Manual_Slave_Address_Binding	List of BACnetAddressBinding	O	-
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	O	-
Slave_Address_Binding	List of BACnetAddressBinding	O	-
Profile_Name	CharacterString	O	-
Baud rate (proprietary 701)	UNSIGNED: 9600, 19200, 38400, 76800	O	W
MAC-address (proprietary 702)	UNSIGNED: 0-127 master, 128-254 slave	O	W

1 = BACnet Conformance Code 135-2004
2 = BACnet Conformance Code DI-24

R = Required + Readable
W = Writable
O = Optional
- = Not supported

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Binary-Input Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier (1-24)	R	R
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
Present_Value	BACnetBinaryPV	R^1	R^1
Description	CharacterString (max. 16 characters)	O	W
Device_Type	CharacterString (max. 16 characters)	O	W
Status_Flags	BACnetStatusFlags	R	R
Event_State	BACnetEventState	R	R
Reliability	BACnetReliability	O	-
Out_Of_Service	BOOLEAN	R	W
Polarity	BACnetPolarity	R	W
Inactive_Text	CharacterString (max. 8 characters)	O2	W
Active_Text	CharacterString (max. 8 characters)	O2	W
Change_Of_State_Time	BACnetDateTime	O3	-
Change_Of_State_Count	Unsigned	O3	-
Time_Of_State_Count_Reset	BACnetDateTime	O3	-
Elapsed_Active_Time	Unsigned32	O4	-
Time_Of_Active_Time_Reset	BACnetDateTime	O4	-
Time_Delay	Unsigned	O5	-
Notification_Class	Unsigned	O5	-
Alarm_Value	BACnetBinaryPV	O5	-
Event_Enable	BACnetEventTransitionBits	O5	-
Acked_Transitions	BACnetEventTransitionBits	O5	-
Notify_Type	BACnetNotifyType	O5	-
Event_Time_Stamps	BACnetARRAY[3] of BACnetTimeStamp	O5	-
Profile_Name	CharacterString	O	-
DS-COVU-B (proprietary 700)	BOOLEAN: FALSE=no COV, TRUE=COV-U	O	W

R^1 = Writable if OutOfService is TRUE

1 = BACnet Conformance Code 135-2004
2 = BACnet Conformance Code DI-24

R = Required + Readable
W = Writable
O = Optional
- = Not supported

15 BACnet PICS DO-8

Date:	11. 01.2009
Vendor Name:	MBS GmbH
Product Name:	BACnet I/O module DO-8
Product Model Number:	DO-8
Application Software Version:	1.0
Firmware Revision:	1.0
BACnet Protocol Version:	1
BACnet Protocol Revision:	4

Product Description:
The MBS DO-8 module is a highly reliable BACnet Digital-Output module supporting 8 channels digital relay output.

The module supports all standardized BACnet MS/TP baud rates from 9600 up to 76800 bit/s. The modules may run in MS/TP master and slave mode.

BACnet Standardized Device Profile (Annex L):
- ☐ **BACnet Operator Workstation (B-OWS)**
- ☐ **BACnet Building Controller (B-BC)**
- ☐ **BACnet Advanced Application Controller (B-AAC)**
- ☑ **BACnet Application Specific Controller (B-ASC)**
- ☐ **BACnet Smart Sensor (B-SS)**
- ☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Blocks Supported (Annex K):

DS-RP-B	Data Sharing-ReadProperty-B
DS-WP-B	Data Sharing-WriteProperty-B
DS-COVU-B	Data Sharing-ChangeofValue Unsolicited-B
DM-DDB-B	Device Management-DynamicDeviceBinding-B
DM-DOB-B	Device Management-DynamicObjectBinding-B
DM-DCC-B	Device Management-DeviceCommunicationControl-B
DM-RD-B	Device Management-ReinitializeDevice-B

The fixed password for DeviceCommunicationControl and ReinitializeDevice services is: "BACnet-MBS-GmbH" encoded in the ANSI X3.4 character set.

Segmentation Capability:
- ☐ Segmented requests supported   Window Size: -
- ☐ Segmented responses supported   Window Size: -

Data Link Layer Options:
- ☐ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8) baud rate(s) _____
- ☑ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- ☑ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800

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☐   Point-To-Point, EIA 232 (Clause 10)   baud rate(s) _____

☐   Point-To-Point, modem, (Clause 10)   baud rate(s) _____

☐   LonTalk, (Clause 11) medium:_____

☐   Other: _____

Device Address Binding:
Is static device binding supported? (This is currently necessary for
two-way communication with MS/TP slaves and certain other devices.)

☐   Yes

☑   No

Networking Options:

☐   Router, Clause 6

☐   Annex H, BACnet Tunneling Router over IP

☐   BACnet/IP Broadcast Management Device (BBMD)
    ☐   Does the BBMD support registrations by Foreign Devices?

Character Sets Supported:
Indicating support for multiple character sets does not imply that they
can all be supported simultaneously.

☑   ANSI X3.4

☐   IBM™/Microsoft™ DBCS

☐   ISO 8859-1

☐   ISO 10646 (UCS-2)

☐   ISO 10646 (UCS-4)

☐   JIS C 6226

**If this product is a communication gateway, describe the types of
non-BACnet equipment/networks(s) that the gateway supports:**
No gateway functionality yet.

Remarks:
If set to slave mode, the supported Device Profile is reduced to B-SA.

The BIBB DS-COV-U-B is not supported in slave mode.

The BIBB DM-DCC-B supports infinite lifetime only.

The BIBB DM-RD-B supports both cold-start and warm-start.

The BIBBS DM-DCC-B and DM-RD-B are supported with the optional
password only. The fixed password is: "BACnet-MBS-GmbH".

Standard Object Types Supported:

The supported object-types are DEVICE (**BACnetObjectType** ::= ENUMERATED 8) and Binary-Output (**BACnetObjectType** ::= ENUMERATED 4).
Creation and Deletion of objects is not supported.

Device Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier	R	W
Object_Name	CharacterString (max. 16 characters)	R	W
Object_Type	BACnetObjectType	R	R
System_Status	BACnetDeviceStatus	R	R
Vendor_Name	CharacterString	R	R
Vendor_Identifier	Unsigned16	R	R
Model_Name	CharacterString	R	R
Firmware_Revision	CharacterString	R	R
Application_Software_Version	CharacterString	R	R
Location	CharacterString	O	-
Description	CharacterString	O	-
Protocol_Version	Unsigned	R	R
Protocol_Revision	Unsigned	R	R
Protocol_Services_Supported	BACnetServicesSupported	R	R
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	R
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R	R
Max_APDU_Length_Accepted	Unsigned (max. 50)	R	R
Segmentation_Supported	BACnetSegmentation	R	R
Max_Segments_Accepted	Unsigned	O	-
VT_Classes_Supported	List of BACnetVTClass	O	-
Active_VT_Sessions	List of BACnetVTSession	O	-
Local_Time	Time	O	-
Local_Date	Date	O	-
UTC_Offset	INTEGER	O	-
Daylight_Savings_Status	BOOLEAN	O	-
APDU_Segment_Timeout	Unsigned	O	-
APDU_Timeout	Unsigned (10.000 ms)	R	R
Number_Of_APDU_Retries	Unsigned (5)	R	R
List_Of_Session_Keys	List of BACnetSessionKey	O	-
Time_Synchronization_Recipients	List of BACnetRecipient	O	-
Max_Master	Unsigned (127)	O	R
Max_Info_Frames	Unsigned (1)	O	R
Device_Address_Binding	List of BACnetAddressBinding (empty)	R	R
Database_Revision	Unsigned (1)	R	R
Configuration_Files	BACnetARRAY[N] of BACnetObjectIdentifier	O	-
Last_Restore_Time	BACnetTimeStamp	O	-
Backup_Failure_Timeout	Unsigned16	O	-
Active_COV_Subscriptions	List of BACnetCOVSubscription	O	-
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	O	-
Manual_Slave_Address_Binding	List of BACnetAddressBinding	O	-
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	O	-
Slave_Address_Binding	List of BACnetAddressBinding	O	-
Profile_Name	CharacterString	O	-
Baud rate (proprietary 701)	UNSIGNED: 9600, 19200, 38400, 76800	O	W
MAC-address (proprietary 702)	UNSIGNED: 0-127 master, 128-254 slave	O	W

1   =   BACnet Conformance Code 135-2004
2   =   BACnet Conformance Code DO-8

R   =   Required + Readable
W   =   Writable
O   =   Optional
-    =   Not supported

Binary-Output Object Type

Property Identifier	Property Datatype	1	2
Object_Identifier	BACnetObjectIdentifier (1-8)	R	R
Object_Name	CharacterString	R	W
Object_Type	BACnetObjectType	R	R
Present_Value	BACnetBinaryPV	W	W
Description	CharacterString (max. 16 characters)	O	W
Device_Type	CharacterString (max. 16 characters)	O	W
Status_Flags	BACnetStatusFlags	R	R
Event_State	BACnetEventState	R	R
Reliability	BACnetReliability	O	-
Out_Of_Service	BOOLEAN	R	W
Polarity	BACnetPolarity	R	W
Inactive_Text	CharacterString (max. 8 characters)	O1	W
Active_Text	CharacterString (max. 8 characters)	O1	W
Change_Of_State_Time	BACnetDateTime	O2	-
Change_Of_State_Count	Unsigned	O2	-
Time_Of_State_Count_Reset	BACnetDateTime	O2	-
Elapsed_Active_Time	Unsigned32	O3	-
Time_Of_Active_Time_Reset	BACnetDateTime	O3	-
Minimum_Off_Time	Unsigned32	O	-
Minimum_On_Time	Unsigned32	O	-
Priority_Array	BACnetPriorityArray	R	R
Relinquish_Default	BACnetBinaryPV	R	W
Time_Delay	Unsigned	O4	-
Notification_Class	Unsigned	O4	-
Feedback_Value	BACnetBinaryPV	O4	-
Event_Enable	BACnetEventTransitionBits	O4	-
Acked_Transitions	BACnetEventTransitionBits	O4	-
Notify_Type	BACnetNotifyType	O4	-
Event_Time_Stamps	BACnetARRAY[3]ofBACnetTimeStamp	O4	-
Profile_Name	CharacterString	O	-
DS-COVU-B (proprietary 700)	BOOLEAN: FALSE=no COV, TRUE=COV-U	O	W

1 = BACnet Conformance Code 135-2004
2 = BACnet Conformance Code DO-8

R = Required + Readable
W = Writable
O = Optional
- = Not supported

The manual switches override the PresentValue at priority level 1 (manual life-safety) of the respective channel. Priority level 1 and 6 are not writable using the BACnet WriteProperty service.